

SDMS Document ID



379721

ADDENDUM TO THE
ANALYTICAL RESULTS REPORT
COLLEGE OF THE CANYONS SMELTER SITE
CANON CITY, COLORADO
TDD #T08-9410-014

*Revision of this
was not delivered
before the
contract ended.
P. Smith*

Prepared for:
U.S. Environmental Protection Agency
Region VIII, Denver, Colorado
Pat Smith, Site Assessment Manager

Prepared by:
Ecology and Environment, Inc.
Technical Assistance Team
D'Arcy Straub, Project Manager

Date Submitted: July 14, 1995

APPROVALS

Ecology and Environment, Inc.

U.S. Environmental Protection Agency

D'Arcy Straub 7/14/95
D'Arcy Straub Date
Project Manager

Pat Smith Date
Site Assessment Manager

Randy Perlis 7/14/95
Randy Perlis Date
TAT Leader

6.0 SURFACE WATER PATHWAY

6.4 Analytical Results

6.4.1 Aqueous Samples

Nineteen surface water samples were gathered to determine whether a release to the surface water pathway had occurred. The results are provided in Table 6. The background samples appear in shaded columns with bold numbers, while values indicative of a release occur with shading. Two samples were collected from background locations. The first background sample is CC-SW-02, which was collected upstream in the Arkansas River. Sample CC-SW-02 serves as a background for sample CC-SW-01 that was collected downstream of the confluence of Forked Gulch and the Arkansas River. The second background sample is CC-SW-11. Background sample CC-SW-11 was collected downstream of the site in Forked Gulch, but was obtained from ground water leaching into the gulch. The concentrations associated with the sample indicate that the water has remained free of contamination. Sample CC-SW-11 serves as the background for all of the samples collected from Forked Gulch.

6.4.2 Sediment Samples

A release to the surface water pathway was also investigated through the collection of sediment samples (Table 8). Three background samples were collected. Sample CC-SE-16 was collected upstream in the Arkansas River and serves as a background sample for sample CC-SE-15. Sample CC-SE-15 was collected downstream of the confluence of Forked Gulch and the Arkansas River. Background sample CC-SE-01 was collected from a tributary of Forked Gulch west of the site and serves as a background sample for samples CC-SE-07 and CC-SE-08. Background sample CC-SE-02 was collected from Forked Gulch just south of the site and serves as the background for all the samples in Forked Gulch. Sample CC-SE-05, which was collected from a tributary of Forked Gulch, was also included in this group as no other suitable background sample could be obtained due to its location relative to the site.

7.0 SOIL EXPOSURE AND AIR PATHWAYS

7.4. Air Monitoring

7.4.1 Methodology

Hi-vol 6 (HV-6) was located at a distance slightly greater than 1/2 mile from the site. The hi-vol was located northeast from the site at the Colorado State Forest Service shops.

9.0 SUMMARY AND CONCLUSIONS

A release of lead was confirmed for one day at the hi-vol station located at the Colorado State Forest Service shops. The hi-vol station was located just outside the 1/2 mile radius ring of the site.

TABLE 8 (page 1 of 2)
VALIDATED SEDIMENT RESULTS (mg/kg)
COLLEGE OF THE CANYONS SMELTER SITE
TDD #T08-9410-014

STATION NUMBER: STATION LOCATION: DATE: TIME:	CC-SE-01 CC-XRF-137 8/31/94 1530 BACKGROUNDS	CC-SE-07 CC-XRF-136 8/31/94 1515	CC-SE-08 CC-XRF-134 8/31/94 1452	CC-SE-02 CC-XRF-139 8/31/94 1553 BACKGROUNDS	CC-SE-03 CC-XRF-140 8/31/94 1600	CC-SE-04 CC-XRF-130 8/31/94 1405	CC-SE-05 CC-XRF-131 8/31/94 1435	CC-SE-06 CC-XRF-125 8/31/94 1155
Aluminum	5,320	6,690	11,100	3,300	14,100	31,800	16,000	18,800
Antimony	10.7 UJ	13.8 J	35.0 J	10.6 UJ	14.3 J	15.6 UJ	27.0 J	14.1 UJ
Arsenic	1.6 J	99.0	61.3	0.89 J	6.1 J	201	330	47.0
Barium	48.8	79.1	98.3	35.8 J	187	305	188	208
Beryllium	1.1 U	1.2 U	1.2 U	1.1 U	1.1 U	1.6 U	1.4 U	1.4 U
Cadmium	2.1	8.2	7.2	1.1 U	37.3	42.1	17.1	10.1
Calcium	6,060	3,220	3,460	4,090	20,900	26,200	2,850	11,500
Chromium	6.6	6.4	14.6	3.5	13.0	27.5	16.0	17.1
Cobalt	7.3 J	2.6 J	3.8 J	3.2 J	10.4 J	13.3 J	4.3 J	7.6 J
Copper	12.7	78.1	94.6	6.3	22.7	291	386	79.6
Iron	18,700	115,000	68,600	7,630	22,300	66,400	108,000	36,000
Lead	11.9	6,850	3,020	10.6	249	7,330	11,400	891
Magnesium	3,390	2,610	3,470	1,830	6,630	11,800	4,160	7,280
Manganese	247	421	629	143	1,910	1,420	558	545
Mercury	0.04 U	0.05 U	0.05 U	0.04 U	0.05 U	0.30	0.49	0.05 J
Nickel	4.7 J	4.8 U	6.9 J	4.7 J	14.2	20.4	13.5	10.8 J
Potassium	1,360	2,410	3,060	780 J	4,500	9,440	5,410	4,510
Selenium	1.1 R	1.2 R	1.2 R	0.21 R	1.1 R	1.6 R	1.4 R	1.4 R
Silver	2.1 U	13.3	3.8	2.1 U	2.2 U	13.3	22.5	2.8 U
Sodium	195 J	343 J	366 J	145 J	248 J	4,230	654 J	588 J
Thallium	0.43 U	1.1 J	0.66 J	0.42 U	0.45 U	1.3 J	2.5 J	0.57 U
Vanadium	32.5	25.4	34.0	14.5	34.6	64.5	43.5	46.3
Zinc	150 J	968 J	1,090 J	14 J	5,520 J	6,580 J	3,680 J	1,410 J
Cyanide	0.53 U	0.60 U	0.60 U	0.53 U	0.56 U	0.78 U	0.70 U	0.71 U

- U = The material was analyzed for, but not detected. The associated numerical value is the sample detection limit or adjusted sample detection limit.
J = The associated numerical value is an estimated quantity because the reported concentrations were less than the required detection limits or quality control criteria were not met.
UJ = The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.
R = The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.

TABLE 8 (page 2 of 2)
VALIDATED SEDIMENT RESULTS (mg/kg)
COLLEGE OF THE CANYONS SMELTER SITE
TDD #T08-9410-014

STATION NUMBER: STATION LOCATION: DATE: TIME:	CC-SE-09 CC-XRF-124 8/31/94 1152	CC-SE-10 CC-XRF-122 8/31/94 1130	CC-SE-11 CC-XRF-120 8/31/94 1110	CC-SE-12 CC-ZRF-118 8/31/94 1057	CC-SE-13 CC-XRF-114 8/31/94 1013	CC-SE-14 CC-XRF-113 8/31/94 0957	CC-SE-16 CC-XRF-112 8/31/94 1000 BACKGROUNDS	CC-SE-15 CC-XRF-111 8/31/94 0955
Aluminum	18,700	5,730	7,480	9,240	21,600	18,500	12,500	15,300
Antimony	20.1 J	12.4 UJ	12.0 UJ	12.9 UJ	21.6 J	13.2 UJ	12.7 UJ	13.7 UJ
Arsenic	159	40.0	26.5	28.3	70.1	5.8 J	2.5 U	3.0 J
Barium	184	55.4	97.4	100	207	175	147	221
Beryllium	1.5 U	1.2 U	1.2 U	1.3 U	1.5 U	1.3 U	1.3 U	1.4 U
Cadmium	16.1	2.7	5.7	6.1	13.5	2.7	1.8	2.3
Calcium	13,700	3,570	3,660	6,120	9,700	29,700	18,000	20,000
Chromium	19.3	5.4	8.1	9.6	21.9	19.1	17.7	21.9
Cobalt	8.1 J	3.4 J	5.3 J	7.9 J	9.4 J	8.5 J	7.8 J	11.2 J
Copper	264	29.0	35.6	54.3	111	27.2	15.0	21.0
Iron	78,600	23,200	25,400	32,100	46,400	25,900	21,700	29,700
Lead	6,000	175	341	451	1,460	111	29.0	38.7 J
Magnesium	6,950	2,970	3,210	4,010	8,090	14,900	8,570	9,870
Manganese	800	376	447	594	1,060	560	376	575
Mercury	0.19	0.05 U	0.05 U	0.05 U	0.10 J	0.05 U	0.05 U	0.05 U
Nickel	10.3 J	7.5 J	9.7	11.1	19.0	16.4	14.2	17.2
Potassium	4,700	1,440	1,760	2,110	5,500	5,350	4,440	5,010
Selenium	1.5 R	1.2 R	1.2 R	1.3 R	1.5 R	1.3 R	1.3 R	1.4 R
Silver	11.4	2.5 U	2.4 U	2.6 U	2.9 U	2.6 U	2.5 U	2.7 U
Sodium	936 J	287 J	212 J	273 J	359 J	284 J	280 J	322 J
Thallium	1.5 J	0.50 U	0.48 U	0.51 U	1.1 J	0.53 U	0.51 U	0.55 U
Vanadium	60.9	20.1	30.1	30.6	57.5	39.5	38.0	55.8
Zinc	2,480 J	545 J	882 J	1,160 J	1,620 J	352 J	227 J	201 J
Cyanide	0.73 U	0.62 U	0.60 U	0.64 U	0.73 U	0.66 U	0.64 U	0.69 U

U = The material was analyzed for, but not detected. The associated numerical value is the sample detection limit or adjusted sample detection limit.
J = The associated numerical value is an estimated quantity because the reported concentrations were less than the required detection limits or quality control criteria were not met.
UJ = The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.
R = The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.

TABLE 6 (page 1 of 3)
VALIDATED SURFACE WATER RESULTS (µg/L)
COLLEGE OF THE CANYONS SMELTER SITE
TDD #T08-9410-014

STATION NUMBER: STATION LOCATION:	CC-SW-02 UPSTREAM IN AK 8/31/94 0956 BACKGROUNDS	CC-SW-01 DOWNSTREAM IN AK 8/31/94 0953	CC-SW-11 GW @ TREE 8/31/94 1123 BACKGROUNDS	CC-SW-03 DRAINAGE BEFORE AK 8/31/94 0959	CC-SW-04 UNDER STANLEY BRIDGE 8/31/94 1011	CC-SW-05 IRRIGATION CANAL 8/31/94 1019
Aluminum	1,550	1,910	254 U	1,340	6,910	2,170
Antimony	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U
Arsenic	2.0 U	2.0 U	2.0 U	2.6 J	16.9	2.0 U
Barium	95.1 J	97.5 J	121 J	78.1 J	140 J	99.9 J
Beryllium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cadmium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Calcium	47,600	47,900	51,900	50,100	70,800	48,500
Chromium	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Cobalt	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Copper	10.0 U	10.0 U	10.0 U	10.0 U	46.2	10.0 U
Iron	1,770	2,130	347	2,010	13,600	2,370
Lead	3.0 J	12.1 J	1.4 J	62.0 J	758	7.3 J
Magnesium	12,000	12,000	13,300	12,400	20,400	12,100
Manganese	136	142	14.6 J	81.3	447	104
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U	34.6 J
Potassium	4,300 J	2,510 J	10,700	4,200 J	9,440	4,210 J
Selenium	5.0 R	5.0 R	10.0 R	10.0 R	10.0 R	10.0 R
Silver	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Sodium	15,100	15,500	11,600	15,500	23,000	16,000
Thallium	2.0 UJ	2.0 UJ	2.0 U	2.0 UJ	2.0 UJ	2.0 UJ
Vanadium	10.0 U	10.0 U	10.0 U	10.0 U	13.1 J	10.0 U
Zinc	38.5	80.3	14.7 J	151	629	119

- U = The material was analyzed for, but not detected. The associated numerical value is the sample detection limit or adjusted sample detection limit.
J = The associated numerical value is an estimated quantity because the reported concentrations were less than the required detection limits or quality control criteria were not met.
UJ = The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.
R = The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.

TABLE 6 (page 2 of 3)
VALIDATED SURFACE WATER RESULTS (µg/L)
COLLEGE OF THE CANYONS SMELTER SITE
TDD #T08-9410-014

STATION NUMBER: STATION LOCATION:	CC-SW-06 CREEK BETWEEN HIGHLAND AND JUNKYARD 8/31/94 1027	CC-SW-07 GW SEEP FROM HILLSIDE 8/31/94 1032	CC-SW-08 UPSTREAM OF SEEPS BEFORE KOCHS 8/31/94 1034	CC-SW-09 "SEWER" WATER INFLUENT 8/31/94 1106	CC-SW-10 UPSTREAM OF "SEWER" WATER INFLUENT 8/31/94 1108	CC-SW-12 UPSTREAM OF GW @ TREE 8/31/94 1132
DATE: TIME:						
Aluminum	30,900	103 U	16,400	50.0 U	20,000	6,760
Antimony	52.0 J	50.0 U	50.0 U	50.0 U	50.0 U	50.0 U
Arsenic	74.6	2.2 J	51.2	2.0 U	95.7	33.4
Barium	406	21.8 J	242	73.5 J	255	109 J
Beryllium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Cadmium	19.1	5.0 U	7.5	5.0 U	13.6	5.0 U
Calcium	127,000	87,100	123,000	108,000	195,000	198,000
Chromium	27.6	10.0 U	10.0 U	10.0 U	25.6	10.0 U
Cobalt	11.6 J	10.0 U	10.0 U	10.0 U	12.8 J	10.0 U
Copper	211	10.0 U	127	10.0 U	175	55.2
Iron	77,000	1,250	42,400	87.6 J	54,400	16,400
Lead	4,300	4.4 J	3,010	1.0 UJ	4,540	1,300
Magnesium	40,300	29,600	37,300	35,400	62,200	62,300
Manganese	2,080	136	1,070	84.2	1,290	693
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	21.4 J	20.0 U	20.0 U	20.0 U	20.0 U	20.0 U
Potassium	24,200	5,320	20,100	5,570	20,100	16,400
Selenium	10.0 R	10.0 R	10.0 R	10.0 R	10.0 R	10.0 R
Silver	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Sodium	44,500	49,200	46,600	28,200	114,000	123,000
Thallium	2.0 UJ	2.0 UJ	2.0 UJ	2.0 U	2.0 UJ	2.0 UJ
Vanadium	78.1	10.0 U	38.8 J	10.0 U	50.4	17.8 J
Zinc	2,980	24.5	1,950	14.3 J	2,980	1,140

U = The material was analyzed for, but not detected. The associated numerical value is the sample detection limit or adjusted sample detection limit.

J = The associated numerical value is an estimated quantity because the reported concentrations were less than the required detection limits or quality control criteria were not met.

UJ = The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.

R = The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.

TABLE 6 (page 3 of 3)
VALIDATED SURFACE WATER RESULTS (µg/L)
COLLEGE OF THE CANYONS SMELTER SITE
TDD #T08-9410-014

STATION NUMBER: STATION LOCATION:	CC-SW-13 DOWNSTREAM OF CONF. OF MAIN & WEST 8/31/94 1152	CC-SW-14 UPSTREAM OF CONF. OF MAIN & WEST 8/31/94 1155	CC-SW-15 W OF VALLEY RD AT MAIN & WEST 8/31/94 1427	CC-SW-16 DRAINAGE N OF VALLEY RD & MAIN 8/31/94 1335	CC-SW-17 WEST OF RED PILES 8/31/94 1335	CC-SW-18 SE CORNER OF VALLEY RD & MARIPOSA 8/23/94 1435	CC-SW-19 WESTERN DRAINAGE 8/25/94 1531
Aluminum	474 U	2,700	75.2 U	291,000	232,000	936,000	794,000
Antimony	50.0 U	50.0 U	50.0 U	2,120	2,240	5,620	8,680
Arsenic	3.0 J	15.2	2.1 J	20,600	2,780	40,100	6,700
Barium	33.3 J	54.1 J	35.8 J	59.5 J	7.4 J	5.9 J	25.0 U
Beryllium	5.0 U	5.0 U	5.0 U	13.8	15.7	40.5	54.6
Cadmium	5.8	5.0 U	5.0 U	7,270	4,070	18,200	14,600
Calcium	367,000	373,000	344,000	260,000	268,000	423,000	640,000
Chromium	10.0 U	10.0 U	10.0 U	194	179	467	676
Cobalt	10.0 U	10.0 U	10.0 U	92.4	311	286	1,260
Copper	15.0 J	16.3 J	10.0 U	21,100	34,700	48,700	111,000
Iron	1,310	4,730	301	2,930,000	5,690,000	6,120,000	13,900,000
Lead	82.5 J	224 J	7.0 J	130 J	20.0 UJ	20.0 UJ	20.0 UJ
Magnesium	122,000	121,000	99,700	91,900	304,000	237,000	892,000
Manganese	783	674	79.6	141,000	522,000	396,000	1,560,000
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	20.0 U	20.0 U	20.0 U	275	2,140	832	7,510
Potassium	16,100	10,900	6,130	2,840 J	2,000 U	2,000 U	10,000 U
Selenium	10.0 R	1.7 R	10.0 R	10.0 R	20.0 R	20.0 R	20.0 R
Silver	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	50.0 U
Sodium	297,000	287,000	185,000	6,020	265 J	1,740 J	644 J
Thallium	2.0 UJ	2.0 UJ	2.0 UJ	20.0 UJ	40.0 U	40.0 U	41.2 J
Vanadium	10.0 U	10.0 U	10.0 U	208	10.0 U	686	50.0 U
Zinc	1,030	1,250	272	1,170,000	1,100,000	3,050,000	3,260,000

U = The material was analyzed for, but not detected. The associated numerical value is the sample detection limit or adjusted sample detection limit.

J = The associated numerical value is an estimated quantity because the reported concentrations were less than the required detection limits or quality control criteria were not met.

UJ = The material was analyzed for, but not detected. The reported detection limit is estimated because quality control criteria were not met.

R = The sample results are rejected (analyte may or may not be present) due to gross deficiencies in quality control criteria. Any reported value is unusable. Resampling and/or reanalysis is necessary for verification.